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ABSTRACT

Attention has been studied in four major areas of research: 1) an orientation reaction which must be present before an organism can receive stimulation; 2) a mediating response which directs further action to the stimulus being presented; 3) a cognitive or perceptual state in which the organism selects certain stimuli and excludes others; and 4) the relation between a stimulus and a response. Studying attention within the context of those conditions under which an organism will come under the control of certain stimuli, such as a film or audio tape, might be facilitated by studying the manipulation of stimulus conditions and the behavioral effects observed. Stimulus control procedures and techniques currently being used in infrahuman studies are presently being modified for use with human subjects, and a review of the literature suggests that the "conjugate reinforcer system" which provides some measure of responding during a stimulus presentation may be most useful for application in learning situations. (Author/SH)

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Attention to Audio-Visual Media; Some Measurement Techniques

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Attention has been studied in four major areas of research: 1) an orientation reaction which must be present before an organism can receive stimulation; 2) a mediating response which directs further action to the stimulus being presented; 3) a cognitive or perceptual state in which the organism selects certain stimuli and excludes others; 4) the relation between a stimulus and a response; i.e., stimulus control.

Attention as an orientation reaction

The orientation reaction refers to a change in the physical state of the organism. This change is an antecedant condition for receiving stimulation. In the orientation reaction, the pupil of the eye dilates, on-going reactions are temporarily arrested, the auditory threshold decreases, the organism turns to face the stimulus, and GSR and Heart Rate appear to be more irregular. (Maltzman and Raskin, 1966; Lynn, 1966; Meldman, 1970; Luria and Homskaya, 1970).

Attention as a mediating response

Mediating responses facilitate the reception of stimuli and help direct action to those stimuli. An internal process is hypothesized for selecting certain stimuli from those presented. Operationally, we may define the mediating response as any response which enables a specific stimulus

to be presented. The organism can then make additional responses to this stimulus. (Wyckoff, 1952; Holland, 1957; Blair, 1958; Kelleher, 1958; Baker, 1960; Reynolds, 1961; Lindsley, 1962; Nathan and Wallace, 1965).

Attention as a cognitive or perceptual state

The cognitive or perceptual definitions of attention posit a change in the functioning of the organism. This change has been referred to as awareness, (Titchener, 1966), passive attention, (Bleuler, 1924, Rapaport, 1945), active attention, (Reik, 1948), focal attention, (Schactel, 1953), concentration, (Rapaport, 1945), selective attention, (Sullivan, 1956) and perceptual set, (Hebb, 1949).

Attention as stimulus control

Skinner (1953) calls attention " ... a controlling relation - the relation between a response and a discriminative stimulus. When someone is paying attention he is under the control of a stimulus. ...(Skinner, 1953, pp. 122-124)" (Terrace, 1966, p. 289) Researchers involved in this type of procedure include Mackintosh (1970), Honig (1970) and Baron (1965).

Analysis

In attention we are dealing with the conditions under which an organism will come under the control of certain stimuli; e.g., a film or audio tape. Studying attention in such a context might be facilitated by studying the manipulation of stimulus conditions and the behavioral effects observed. At present, stimulus control procedures in infrahuman studies are being modified for studying stimulus control with human subjects (Taylor, 1970). From a practical standpoint, techniques and procedures derived from studies of this nature might be amenable to application in a learning situation.

Measurement techniques

The review of procedures and techniques that follows covers only those studies dealing with attention as a response which can be specified and manipulated empirically.

Wyckoff (1952), has operationally defined attention as a mediating response which is required before the subject can be exposed to a discriminative stimulus. In a discrimination learning experiment with pigeons, the key was illuminated with a white light until a pedal pushing

response (mediating response) occurred, When the mediating response was emitted, the key changed from white to red or green. During red key periods,a key pecking response was reinforced on a Fixed Interval (FI) 30 second schedule and during green key periods reinforcement for the key pecking response was withheld (Extinction). The duration of the pedal pushing response increased as the discrimination developed. (Kelleher, 1958)

Kelleher (1958) modified Wyckoff's technique for use with primates. A "stimulus-producing response" (Rs) consisted of operating a telegraph key to produce a discriminative stimulus. The monkey could then receive reinforcement by pressing another telegraph key (the food-producing response - Rf). The Rs was reinforced on several Fixed Ratio schedules and the Rf was reinforced on a Variable Ratio 100 schedule. The reinforcement contingency for Rs affected the rate of responding for Rf; i.e., as the number of responses required for an opportunity to respond to a second stimulus increased, the rate of responding for Rf also increased.

Holland (1957) developed a technique for measuring observing responses in human subjects engaged in a

vigilance task. Subjects emitted an observing response by pushing a button to light a dial. The subject then pushed another button to reset the needle if he noticed a deflection (the reinforcement).

Recently, experiments using some procedures adapted from the above studies have been conducted using motion pictures and soundtracks as visual and auditory stimuli. Jeffrey (1955), Bijou et. al. (1959) and Baer (1960) have found that children will respond to maintain the presentation of sound movies.

Lindsley (1962) developed a technique to determine the reinforcing effects of a televised image or its soundtrack. He used a conjugate reinforcement system in which the subject's responses varied the intensity of a television picture or the amplitude of the audio. In Lindsley's system, the auditory or visual stimulus was under control of the viewer who pushed a small button. Response rates above 60 per minute kept the picture or sound stimulus at full intensity. Lindsley noted that the operant response of pushing a button eventually became equated with a "looking" response such as bending the head or focusing the eye.

Nathan and Wallace (1965) modified Lindsley's conjugate reinforcement technique in three ways: 1) subjects pushed foot pedals to provide cumulative records of both looking and listening responses made to produce the stimuli, Looking and listening responses were collected simultaneously; 2) the stimulus presentation instrumentation was re-designed to permit the presentation of slides, television programs and sound motion pictures; 3) the response rate and force required to respond were adjusted for each individual by determining his baseline performance. Stimulus material presented consisted of a football game with four commercials interspersed. Results showed that the occurence of the looking and listening responses were correlated; i.e., when a subject responded to look, he also responded to listen.

Friedlander (1969, 1971) developed the PLAYTEST, a type of conjugate reinforcement system in which a child controlled the presentation of one of two available stimuli. Responding to each stimulus was constantly recorded to determine the attention given to each stimulus.

Palmer (1971) and Computer Based Project (1971) have specified indicies of attention such as eye movements, motor behavior and verbal behavior. These indicies merely specify a set of behaviors that may accompany attention. However, it is not evident which portion of the stimulus, the audio or the visual, the subject was attending at the time the judgement on attending was made. Without evidence that the subject is under control of the stimulus being presented it is difficult to study the effects of specific stimuli on behavior.

Recommendations

At present the conjugate reinforcer system (Lindsley, 1962; Nathan and Wallace, 1965; Friedlander, 1969, 1971) seems appropriate for studying the effects of stimulus variables presented visually and auditorially. This procedure provides some measure of responding during a stimulus presentation since the stimuli are under the control of the observer - a necessary condition for studying the efffects of stimuli on behavior.

By providing a reliable measure of attention such as the conjugate reinforcement system, additional techniques can be

developed for measuring other behavioral effects of stimuli. These might include eye movements, facial movement, body movement, verbal behavior, and physiological phenomena (EEG, GSR, Heart Rate etc.)

Currently, a conjugate reinforcement system is planned for the Computer Based Project for use in monitoring attention to captioned and uncaptioned films.

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